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NON CONVENTIONAL HYBRID CONCRETE: A REVIEW

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ABSTRACT: Conventional concrete is a mixed construction material composed of cement, aggregate and water. This study includes use of various waste materials as a partial replacement of cement or aggregate. This partial replacement of various ingredients creates a Non Conventional Hybrid Concrete. Industries in India produce a lots of waste which might be useful in partial replacement of all the raw materials due to their cementing properties. The various waste materials such as lime sludge, sugarcane bagasse ash, foundry sand and wood ash are some of materials which can be used. The main focus of this study is to reduce the industrial and agricultural waste for eco friendly environment. Various chemical admixtures are also added to achieve varied properties. The parameters that decided the feasibility of Hybrid Concrete. Concrete are flexural and compressive study.

KEYWORDS – Hybrid Concrete, Compressive & Flexural Strength.

I. INTRODUCTION

Concrete, one of the most important construction materials in the construction industries and development facilities, has the likely for significant and positive environmental participation. Concrete is a composite construction material composed of aggregate, cement and water. There are many formulations that have varied properties. The aggregate is generally coarse gravel or crushed rocks such as lime stone or granite, along with a fine aggregate such as sand. The cement commonly Portland cement and other cementitious materials such fly ash and slag cement, serve as a binder for the aggregate.

Various chemical admixtures are also added to achieve various properties. Water mixed with this dry composite enables it to be shaped and then solidified and hardened into rock-hard strength through a chemical process called hydration. The water reacts with the cement which bonds the other components together, eventually creating a robust stone-like material. Concrete has relatively high compressive strength, but much lower tensile strength. For this reason it is usually reinforced with material that is strong in tension (often steel).

Cement plays the important role of a binder, which sets and hardens as well as it plays role to bind alternative materials along. Nowadays Cement is widely used in construction industry and it is 2nd largest material after water in concrete construction. If we find material which is suitable as a partial replacement of cement, then for large extent we can save cement and environment as well as reduce cost of construction.

II. REVIEW OF LITERATURE

The Study of use of lime sludge & fly ash as partial replacement of cement in mortar was carried out by Vaishali Sahu. The fly ash and ordinary Portland cement was sieved and portion retained on 90 micron was used. The sludge was oven dried for about 16-18 hours at 60°C and the lumps were broken gently using the pestle. It was sieved through 150 micron sieve and portion retained on 90 micron sieve was used. Two sets of mortar mix (type I and type II) were prepared, each set with two different types of binders. Type I mortar is cement less mortar, where 100% cement is replaced with a combination of fly ash and lime sludge with 0 & 1% of gypsum. Type II mortar consists of 20% cement content, fly ash and lime sludge. All the sets of mortar were prepared with 1:3 binder-to-sand ratio. They concluded that the addition of gypsum showed positive effect on strength due to accelerated pozzolanic reaction. For type I mortar (mortar with 0% cement content), the highest strength of 6 N/mm^2 was observed, for binder with 1% gypsum, after 28 days curing period. By increasing the content of Lime sludge and subsequent decrease of Fly ash content under mortar with 20% cement showed increased strength of binder IV as compared to binder III. The maximum strength achieved

after 28 days curing for type II mortar was 14 N/mm^2. The application of sugarcane bagasse ash as a partial cement replacement material was investigated by Biruk Hailu. OPC and PPC was replaced by sugarcane bagasse at different % ratio for M-35 concrete at W/C 0.55. The test result indicated that up to 10% replacement of OPC cement by bagasse ash result in better or similar concrete properties and further environmental and economical advantages can also be exploited by using bagasse ash as a partial cement replacement material. The strength and durability properties of concrete mixture, in which natural sand was replaced with five percentage (0%, 5%, 10%, 15%, and 20%) of waste foundry sand (WFS) by weight. Compression test and splitting tensile strength test were carried out by Gurpreet Singh at the age of 7, 28 and 91 days and Modulus of elasticity , ultrasonic pulse velocity and Rapid Chloride Permeability test were conducted at the age of 28 and 91 days. The abrasion resistance of concrete containing WFS was also investigated. Based on the obtained they conclude that (i) Maximum increase in compressive strength, splitting tensile strength and modulus of elasticity of concrete was observed with 15% WFS, both at 28 and 91 days;(ii) WFS increases the ultrasonic pulse velocity values and decrease the chloride ion penetration in concrete; (iii) Abrasion resistance of concrete increased with the increase in WFS content. They also added that WFS can be suitably use in making structural grade concrete, as well as for applications where abrasion is also important parameter.

The performance of high strength concrete made with copper slag as a replacement for fine aggregate at constant workability and studied the effect of super plasticizer addition on the properties of High Strength Concrete made with copper slag research was carried out by Al-Jabri. They observed that the copper slag of up to 50% . However, further additions of copper slag caused reduction in the strength due to increase in the free water constant in the mix.

The study of replacing natural sand by waste foundry sand. They were replaced artificial sand in various percentages (0%, 5%, 10%, 15%, 20%) of waste foundry sand by weight were stated by Vema Reddy Chevuri, S. Sridhar. They realized that the construction industries and concrete manufactures will need to use available aggregate rather than the perfect aggregate to make ideal concrete suitable for needy purpose. Construction material like steel will produce a lot of industrial waste such as foundry sand so this foundry sand can be used for production of concrete. Conclusion may be drawn from their experimental work that, the compressive strength were increased with increase in foundry sand in concrete mix up to 60% and there after decreased beyond 60% till 100%. Researchers were focusing on the ways of utilizing industrial as well as agricultural waste as a source of raw material for construction industry which may lead economic and environmental pollution control. R. Srinivasan, K. Sathiya were study SCBA obtained by controlled combustion of sugarcane bagasse is used for experiment. They analyze effect of SCBA in concrete by partially replacing of concrete at 0%,5%,10%,15% and 25% by its weight. They observed that compressive strength increases with SCBA up to 10% replacement and then decreases. Their result shows that 5% of replacement gives better compressive strength (29.50 MPa) than conventional concrete(21.47 MPa). It was observed by Amrutha Sebastian, Dona Philip that use of wood ash in concrete mix will make it cost effective and environment friendly product. Wood ash is residue remains after incineration of wood. They were casted sample with 3%,5%, and 8% replacement of cement with wood ash. The casting procedure of cubes were as per IS 516:1959 and IS 456:2000. Compressive strength of M25 concrete after 28 days was 28.8 MPa. From the result it is observed that compressive strength of cube with 8% of cement replacement with wood ash is only 24.74 MPa. Therefore cement can be replaced with wood ash up to 5% safely.

III. OUTCOME & CONCLUSIONS

From the literature study carried out, when fly ash instead of cement up to 8% was used, it is found that 3% to 5% replacement of cement satisfied all the strength requirement, but 5% replacement will be more economic.

In conformity with literature study the compressive strength were increased when aggregate replaced with foundry sand in partial concrete but till up to 60% if it exceed beyond 60% strength will be decreased.

Based upon the literature studies, we can concluded that 10% to 20% cement can be partially replaced by SCBA for higher compressive strength. According to their result 5% of cement replacement with SCBA were gives out optimal result.

According to studied which carried out, it can also concluded that studies based on use of the fertilizer waste has not been done yet. So we will tried to use of the fertilizer waste in our experiment which also help to utilize the waste & minimized the environmental hazard.

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